

TOWERCRAFT INSPECTION REPORT

Comprehensive Building Façade Condition and Risk Assessment Report

1. REPORT OVERVIEW

Report Number	TC-INS-[2025]-[2]
Date	[11-12/10/2025]
Building Name	XXXXX
Location	DUBAI
Customer / Company	XXXXX
Inspection Team	XXXXX
Prepared By	Towercraft Inspection
Weather	36-41 °C
Humidity (%)	%57

2. INTRODUCTION – WHY CONDUCT AN INSPECTION REPORT?

In modern cities, high-rise buildings are exposed to environmental factors such as UV radiation, sandstorms, rain, and wind, which over time create hidden risks.

This report has been prepared with the following strategic objectives:

- **Early detection of hidden issues** (microscopic cracks, corrosion, etc.)
- **Compliance with legal requirements** (Building Safety Act 2022 – UK, Dubai AMP, etc.)
- **Data-driven optimisation of cleaning and maintenance plans**
- **Long-term energy efficiency and cost control**
- **Minimisation of insurance and legal risks**

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3. INSPECTION METHOD AND SCOPE

Stage	Description	Technology Used
1. High Resolution Scanning	General Façade Imaging	Microscope, High-resolution camera
2. Microscopic Analysis	Close-uo surface analysis	Digital Microscope
3. AI-Assisted Analysis	Generating Risk Maps from visuals	AI Analysis Software
4. Risk and Issue Identification	Combining microscopic + macro analysis	PLC & Sensor Data
5. Reporting and Action Plan	Documents of results	Towercraft Data Platform

4. BEFORE & AFTER IMAGES

Note: The numbers on the photographs correspond to the numbers in the table below titled “Types of Contamination and Issues.”

Area	No	Before Dry Clean	After Deep Clean	Description	Contamination Type
North West Facade	Image M1			Dust and mud layer detergent residues	T1-D1

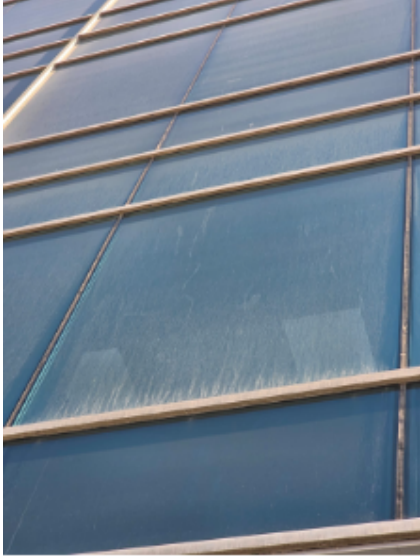

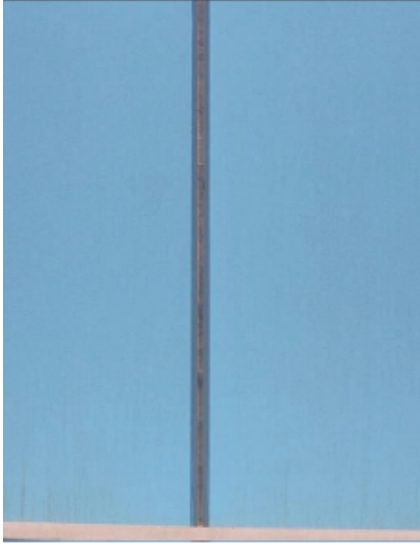
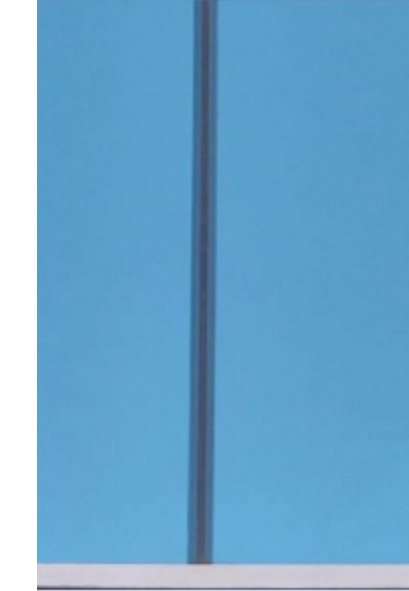
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<p>North West Facade</p>	<p>Image M2</p>			<p>Oxidation and Colour Fading on Aluminium Surfaces</p>	<p>ALOX1</p>
<p>North West Facade</p>	<p>Image M3</p>			<p>Premature Aging and Colour Change (Yellowing/Dulling) in Expansion Joints</p>	<p>GD1MT-CC2</p>

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5. Types of Contamination and Issues

No	Contamination/Issue Type	Code	Description
1	Dust & Mud Layer	T1	Accumulation of particles carried by wind and after rainfall
2	Detergent Residues	D1	Chemical residues on the surface caused by incorrect solution and insufficient rinsing
3	Gasget (Expansion Joint) Premature Aging and Colour Change (Yellowing/Dulling)	GD1	Direct exposure of the gasget material (silicone, polyurethane) to intense UV rays and insufficient or improper rinsing of detergent residues.
4	Oxidation and Colour Fading on Aluminium Surfaces	AL-OX1	Exposure of aluminium surfaces (especially anodised or painted ones) to intense UV radiation and high temperatures leads to surface dullness, chalking, and fading of the original colour. High UV and heat accelerate this deterioration process, while insufficient cleaning allows dirt and chemical residues to act as catalysts, shortening the expected lifespan of the surface.
5	Chemical Residue Corrosion on General Metal Surfaces	MT-CC2	The use of cleaning chemicals with incorrect pH levels or those that are too aggressive for metal surfaces, combined with insufficient rinsing, leads to residue accumulation.

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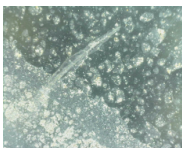
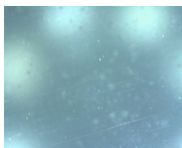
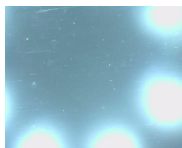

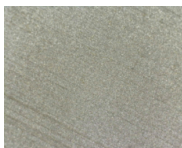
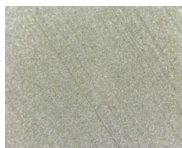

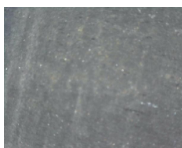

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			<p>Dubai's high temperatures and humid marine air (an electrolytic environment) accelerate the reaction of these chemical residues with the metal surface. This process penetrates the protective coating (causing pitting/corrosion), resulting in deformation of the surface at a much faster rate than expected and significantly reducing its lifespan.</p>
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6. MICROSCOPIC OBSERVATIONS

No	Dirty Area	Dry Clean	Deep Clean	Description	Contamination Type
Image M1 Analysis				Dust & Mud Layer – Detergent Residues	T1-D1
Image M2 Analysis				Oxidation and Colour Fading on Aluminium Surfaces	ALOX1
Image M3 Analysis				Premature Aging and Colour Change (Yellowing/Dullin g) in Expansion Joints	G1 MT-CC2

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Purpose:

Microscopic analysis is used for the early detection of issues that are not visible to the naked eye. The numbers next to the images correspond to the general building photographs.

M1 Glass Surface (Comprehensive Residue Analysis):

Heavy accumulation of dirt, chemical residues, minerals, and environmental particles has been detected. Dubai's high temperature and intense UV radiation cause these chemical residues to penetrate the glass surface rapidly, significantly increasing the risk of permanent dullness and chemical damage, while severely reducing light transmittance.

Dry Clean: Most of the dust and mud particles have been removed; however, at the microscopic level, thin film layers and micro-residues are still observed. This indicates that mineral stains have penetrated the glass pores due to rapid evaporation of dirty water at high temperatures, leaving the glass looking dull and stained.

Deep Clean: Organic, inorganic, and mineral-based residues were deeply dissolved and removed. The glass surface has largely regained its transparency, brightness, and light transmittance, resulting in a much smoother and cleaner appearance.

M2 Aluminium Surface (Mineral, Lime, and Streak Focused):

The surface showed heavy dust, mineral, and lime stains (whitish, irregular spots) with an overall matte and rough appearance. Dubai's hard water and low humidity cause rinse water to evaporate rapidly, making lime deposits permanent and weakening the aluminium's protective oxide layer, leading to dullness and oxidation over time.

Dry Clean: Although surface contamination was reduced overall, non-uniform linear stains (thin film layers caused by water and mineral deposits) remained. The surface appeared dull and streaked.

Deep Clean: The application produced a darker and more uniform surface; mineral stains and dust residues were largely removed. At this stage, the best result was achieved in terms of preserving the aluminium's lifespan and maintaining its aesthetic integrity.

M3 Gasket Surface:

A heavy accumulation of dust, dirt, and particles was observed on the gasket surface. Dubai's persistently high UV radiation and temperature levels cause premature aging of the gasket's base material (typically silicone or polyurethane), while the dust and mineral buildup on the surface accelerates this process—reducing flexibility and increasing the risk of compromised sealing performance.

Dry Clean: Most of the coarse dirt on the gasket surface was removed. However, fine mineral residues and adhered particles remained; the gasket still appeared matte and rough.

Deep Clean: After cleaning, the surface became more uniform. Dirt was significantly reduced, and compared to its initial state, both flexibility and surface quality improved substantially—critical for maintaining the gasket's sealing function.

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7. DETAILED RISK MAP

Area	Identified Issue	Relevant Microscope No	Risk Level	Recommended Action
North West Façade	Dust & Mud Layer Detergent Residues	M1	Medium	Enzyme-based cleaning with UV sterilization
North West Façade	Oxidation and Colour Fading on Aluminium Surfaces	M3	High	Enzyme-based cleaning with UV sterilization
North West Façade	Premature Aging and Colour Change (Yellowing/Dulling) in Expansion Joints	M3	Medium	Chemical sealer and soft washing

8. RESTRICTED ACCESS AREAS

The building's east and west façades have an inward (negatively inclined) design (Image-1), which prevents effective operation of the Towercraft Robot due to standard façade access limitations. Additionally, the glass area at the building's entrance cannot be reached because of the elevation difference (Image-2).

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Image 1

Image 2

9. LEGAL BASIS ACCORDING TO EUROPEAN STANDARDS

Country	Regulation / Standard	Description
United Kingdom	Building Safety Act 2022	Mandatory periodic façade analysis for high-risk buildings
United Kingdom	PAS 9980 Standard	Technical guidance for cladding risk assessment
Dubai	Annual Maintenance Program (AMP)	Mandatory annual façade maintenance and cleaning reporting

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10. PROPOSED ACTION PLAN

Priority	Action	Responsible Team	Estimated Duration	Related Risk No
1	Surface Cleaning	Towercraft Maintenance Team	2 Weeks	1,2,3
4	Annual Inspection Plan	Building Management	1 Day	All risks

11. FINDINGS & CONCLUSION

Microscopic and macro-level examinations revealed that previous cleaning operations conducted by the rope access team caused several adverse effects on the building façade surfaces.

The main errors and their consequences are summarised below:

The detergents and chemical mixtures used were not specifically formulated for glass surfaces but were instead general-purpose ("all-purpose") cleaning products. When not properly rinsed, such products leave a chemical film layer on the glass, reducing optical clarity. This layer affects the glass's transparency and brightness. Over time, it causes **dullness and shadowing** on the glass. Dust and sand particles adhere to this layer, forming a "**film dirt**" coating. Under UV exposure, this layer **changes colour or turns yellowish**.

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The alkaline components and perfume solvents contained in the detergent can **dull the anodised layer**. Prolonged contact may cause **pigment fading or chalking effects** on the paint layer. It was also determined that failure to clean around surface obstacles and insufficient rinsing resulted in colour changes and permanent surface deterioration.

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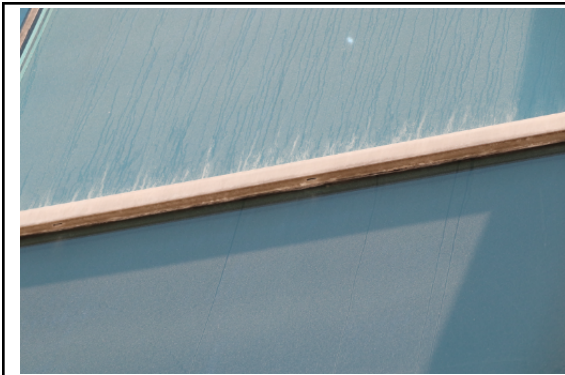


Image -1

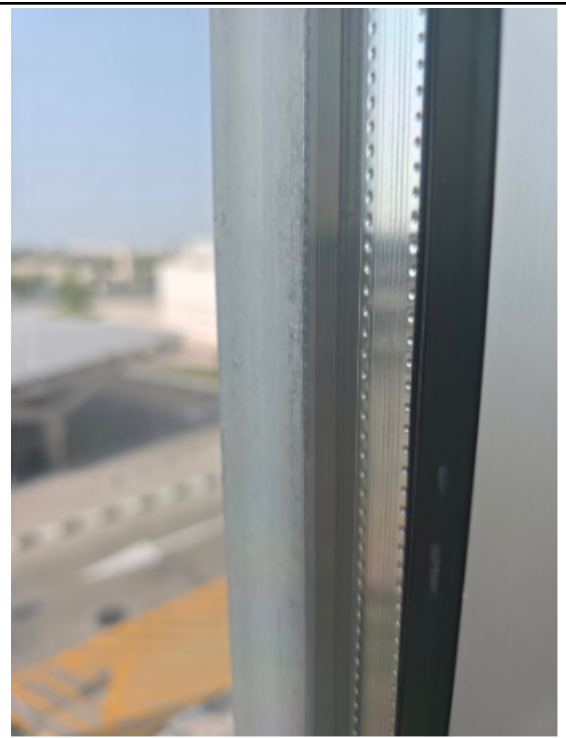


Image -2

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Insufficient rinsing was performed.

Microscopic analyses detected soap residues, mineral deposits, and streak formations on the surface. This indicates that adequate rinsing with clean water was not carried out after cleaning. As a result, drying marks and chemical stains formed on the glass. The aluminium trims and edges were also found to be inadequately cleaned.



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12. REPORT CONCLUSION

This report has been prepared to ensure the building's safety, aesthetic integrity, and legal compliance. Towercraft Inspection is not merely a pre-cleaning step but a strategic decision-making tool for building management.

Application Details:

*Towercraft applied a two-phase cleaning process—**Dry Clean** and **Deep Clean**—on the glass surfaces, aluminium panels, and sealants/joints of the northwest façade:*

- **Dry Clean (Surface Cleaning):** *In the initial phase, accumulated dust and environmental particle layers were removed from all surfaces.*
- **Deep Clean (Detailed Cleaning):** *In this stage, detailed cleaning was performed using special chemical solutions. Dirt residues from sealants, embedded chemical residues, and persistent mineral deposits were treated with suitable solutions, followed by rinsing and drying. The 3 cm vertical and horizontal aluminium trims between the glass panels were also cleaned. This process significantly restored glass transparency while fully removing dirt from aluminium surfaces and joints.*

Visible colour differences and dullness were observed on aluminium trims due to prolonged exposure to strong UV radiation. This confirms surface wear caused by intense UV exposure. Before-and-after surface images and microscopic visuals are attached to the report.

Overall Building Condition:

A thick layer of dust, mud, and mineral deposits was found across the façade, resulting from extended periods without cleaning and exposure to Dubai's harsh environmental conditions (high temperature, intense UV radiation, humidity, and salinity).

Previous manual cleaning operations (including rope access) used detergents applied without proper rinsing, leaving permanent chemical residues on the glass and aluminium surfaces. Over time, these residues combined with mineral deposits, increasing the risk of chemical corrosion.

High temperatures and UV radiation caused these residues to become acidic, penetrating the surfaces and resulting in permanent deformation such as dullness and colour loss on glass, hardening and elasticity loss in sealants, and surface burns and pigment fading on aluminium trims.

Additionally, aluminium trims were found inadequately cleaned. During squeegee cleaning, dirt was spread across trim surfaces and accumulated in these areas. The equipment used could not reach the lower and upper corners of trims, causing surface deformation and colour inconsistencies.

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Main Risk Categories:

- **Mineral and Dust Accumulation Risk:**
A heavy mineral layer was detected on the north façade. Prolonged accumulation reduces glass transparency and aesthetic appearance, causing permanent discolouration and surface dullness on composite panels.
- **Aluminium Coating and Material Degradation Risk:**
High UV radiation and temperature lead to colour fading, burning, and chemical erosion on aluminium surfaces. This is a high-risk category that may result in costly coating restoration requirements.
- **Sealant and Waterproofing Performance Risk:**
Dust, dirt, and mineral buildup reduce sealant elasticity. Over time, this can cause cracking, hardening, and water leakage, particularly at panel joints, creating structural vulnerability.
- **Legal and Insurance Risks:**
*Failure to perform regular inspections exposes the building management to liability under Dubai's **Annual Maintenance Program (AMP)** and international standards. Insurance companies may restrict damage coverage without maintenance and inspection documentation.*

Recommendation:

Join Towercraft's annual inspection program to preserve your building's long-term value.

Critical Priorities:

- **Removal of Mineral and Dust Layers:**
These significantly reduce light transmittance on glass surfaces, impacting visual quality and energy efficiency. Proper chemical and soft-wash methods should be prioritised. Periodic cleaning every three months is recommended using enzyme-based solutions and UV sterilisation methods.
- **Management of Aluminium Surface Deterioration:**
*The risk of UV- and heat-induced colour fading and surface burning is high. Considering the chemical wear and inadequate rinsing caused by detergents used by manual (rope access) cleaning teams, rope access is **not recommended** for cleaning these surfaces.*
- **Protection of Sealants and Waterproofing Components:**
Dust and mineral accumulation cause elasticity loss in sealants. A deep-cleaning and maintenance plan

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should be established. Sealants should be replaced when necessary to prevent water infiltration.

- **Manual Maintenance of Restricted-Access Areas:**

Due to Towercraft Robot's limited ability to clean negatively inclined surfaces, rope access teams may be used for these areas. However, manual interventions must be conducted with extreme care, ensuring surfaces are thoroughly rinsed to eliminate harmful chemical effects.

13. TECHICAL AND ENVIRONMENTAL DATA

Air temperature measured at 36–41 °C, humidity at 57%, and wind speed at 0–20 km/h.

14. APPENDICES

- Appendix-1: Visual reference set of all contamination types
- Appendix-2: High-resolution set of microscopic images
- Appendix-3: Scientific references from European reports
- Appendix-4: Copies of Legal Documents

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